

**DRAPARNALDIA DESIKACHARI SP. NOV.  
(CHAETOPHORALES, CHLOROPHYTA) FROM INDIA**

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**ABSTRACT** - *Draparnaldia desikacharii* sp. nov. is described from Allahabad, India. *D. desikacharii* differs from all the known species of *Draparnaldia* in having multiseriate clusters of short laterals which possess multicellular long hairs with broad apices.

**RÉSUMÉ** - *Draparnaldia desikacharii* sp. nov. est décrit de Allahabad (Inde). *D. desikacharii* diffère de toutes les autres espèces connues de *Draparnaldia* par ses verticilles constitués de courts rameaux qui portent de longs poils pluricellulaires aux apex élargis. (traduit par la rédaction).

**KEY WORDS** : new species, Chlorophyta, Chaetophorales, *Draparnaldia*.

**INTRODUCTION**

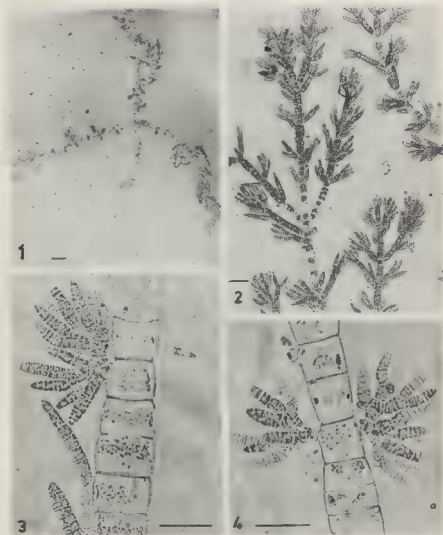
The genus *Draparnaldia* Bory was first discovered by Bory (1808) and to about 50 species have been described (Meyer, 1925; Forest, 1956, 1957; Printz, 1964; Cooke, 1979). However, in India the genus is represented by only 4 species viz., *D. plumosa* (Randhawa, 1936, Saikh & Vaidya, 1972), *D. acuta* (Patel & Vaidya, 1972), *D. iyengarii* (Tiwari, Pandey & Pandey, 1979) and *D. nizarii* Yadava & Pandey, 1984). The present paper deals with a new species of *Draparnaldia* i.e. *D. desikacharii* sp. nov.

**MATERIAL AND METHODS**

The alga was collected from a temporary water channel lying at latitude 25°30'N, longitude, 81°40'E at Handia, Allahabad, India. The alga was found growing attached to the stem of *Ipomoea palmata* and was preserved in 4% formalin for its detailed morphological studies.

## DESCRIPTION OF THE ALGA

The algal thalli were attached or made a gregarious growth on the surface of water and its filaments were usually 4 to 8 cm long and 100 to 360  $\mu$ m in diameter (Fig. 1). Thalli were yellow green in colour with slippery texture. Well developed multicellular basal rhizoids were observed (Fig. 9). However, rhizoids could also arise from any cell of the main axis or lateral branches (Fig. 10). Main axis is uniformly broad but tapers gradually toward the apex (Fig. 7); the axial cells are cylindrical, 24 to 28  $\mu$ m broad and 40 to 46  $\mu$ m long. But the axial cells from which long laterals and clusters of short laterals originate are relatively smaller and sometimes measure up to 14  $\mu$ m in length and 16  $\mu$ m in breadth. Axial cells possess a single parietal shaped chloroplast having irregular margins with 4 pyrenoids. The cells of the main axis may produce branches of long laterals or short laterals. Branches always originate from below a cross wall. In general, branch-bearing cells are smaller than the adjacent cells. Axial cells that give rise to branches possess somewhat protruded angular facets bearing the lateral branches (Fig. 5). The lateral branches are short or long. The short laterals (determinate branches or branches of limited growth) are more common and usually occur in whorls of from 3 to 10. Sometimes an axial cell bears only two opposite short laterals (Fig. 4). The origin of laterals is alternate (Figs. 2, 8), opposite or in whorls (Figs. 3, 8). The present form possesses characteristic multiserial clusters of short laterals (Figs. 7, 8). These short laterals may originate from any cell of the main axis or of the long laterals. Cell contents are usually divided from 2 to 12 tiers transversely and vertically, and give the appearance of multiserial structures (Fig. 10). Even single celled short laterals are multiflorid. Among short laterals only a few terminate in multicellular hairs. These hairs are of trichothallic nature unlike other known species of *Draparnaldia* (Figs. 5, 6). They measure 280  $\mu$ m in length and 5 to 10  $\mu$ m in breadth. Long laterals always originate from the main axis, usually in groups from 4 to 6 either in whorls or opposite, sometimes alternate (Figs. 7, 8). The morphology of long laterals is similar to that of the main axis. Long laterals also appears to be modified short laterals since these are organised in the same manner but exhibit unlimited growth (Bharadwaja, 1933). Cells of the long laterals measure up to 10 to 30  $\mu$ m in length and 14 to 20  $\mu$ m in breadth. In the present form, two types of rhizoids have been observed. One type arises at the cross walls of the filament and the other from the basal cell of the axial filament. They are hyaline, unbranched and multicellular. In certain species of *Draparnaldia* as well as in *Draparnalidiopsis indica* there is an extensive growth of rhizoidal branches at the base of long laterals (Pandey, Tiwari & Pandey, 1974) for support and anchorage, but such rhizoids were not observed in the present alga. In addition, in the present form an interesting feature is the origin of secondary rhizoids from cross wall of the laterals in intercalary as well as from the broken, basal portion of a filament (Fig. 11). It is interesting to note that the rhizoidal part gives rise to a full grown cluster of short lateral (Fig. 10). On the basis of this observation, it can be said that the cross wall of laterals provides a mode of vegetative propagation. Branches are initiated by simple protrusion from the lateral wall at the anterior end of a cell just below the septum (Fig. 5). The initial cell divides by another cross wall into two cells, of which the apical cell turns into a hair. The basal one gives rise to secondary branches in successive manner. Short laterals possess two branch-bearing cells in which the basal cell divides into two and both of these bear whorls of secondary branches. All secondary, tertiary and quaternary branches



Figs. 1-4: *Draparnaldia desikacharii* sp. nov. - 1. Thallus. 2. Disposition of long and short laterals around the main axis. 3. Lateral and opposite short laterals with dense clusters. 4. Opposite clusters of lateral. Scale bars: 100µm in fig. 1; 30µm in fig. 2-4.

first initiate as protrusions as described above and further increase in the number of cells in a branch takes place by intercalary divisions. Hairs also originate from intercalary meristem located at the base (Fig. 5). The hairs are multicellular, gradually becoming broader at the apex and are 17mm long (Figs. 5, 6). These are usually persistent but in many instances short laterals lack hairs. Their cells are cylindrical 10 to 13µm in diameter and are depleted of contents.

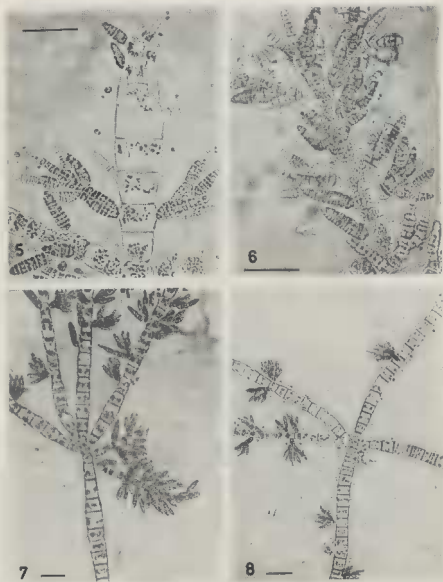
## DISCUSSION

Smith (1950), Prescott (1951) and Printz (1964) classified the species of *Draparnaldia* on the basis of distinct rachis in short laterals, magnitude of corticating rhizoids, shape of short laterals and dimension of thalli. Cook (1970) segregated different species of *Draparnaldia* into two groups and the present alga falls into the first category of Cook along with the species *Draparnaldia glomerata*, *D. platyzonata*, *D. plumosa*, and *D. nizami*. *D. desikacharii* sp. nov. could be compared with *D. glomerata* in general appearance of thallus and in mode of arrangement of laterals. But *D. desikacharii* is distinct in having a much narrower main axis, short and long laterals. In *D. desikacharii* the chloroplast is parietal and band-shaped but in *D. glomerata* it is zonate. *D. desikacharii* also resembles *D. platyzonata* by its possession of short and long laterals; however *D. platyzonata* differs from *D. desikacharii* in having much broader thalli, in shape of chloroplast and in hair-formation with distinct mucilaginous sheath. *D. plumosa* is similar only with the main axis and branching pattern of short laterals. But differences are more pronounced in *D. desikacharii* i.e. clusters of short laterals, cell diameter and in hair formation. *D. desikacharii* could also be compared with *D. nizami* in mode of arrangement of laterals, measurement of thalli and in slippery texture. The later species, however, differs from *D. desikacharii* in absence of clusters of short laterals which are dichotomously or trichotomously branched. The apex of laterals terminate in a pointed cell. Cells are also different, having much broader cells near the point of origin.

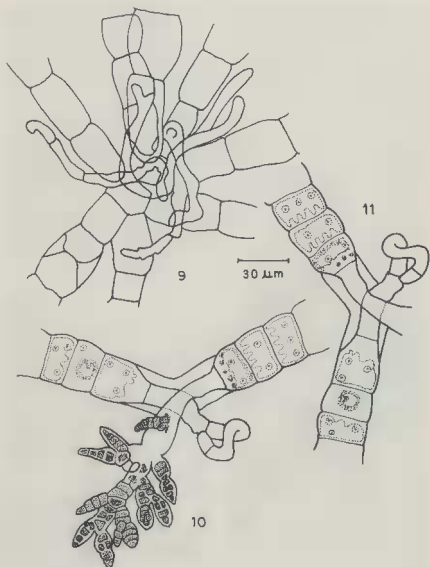
With the comparison of interrelationship of different species of the genus *Draparnaldia* it is clear that the proposed species has its own fundamental characters, i.e. occurrence of multiserial clusters of short laterals and origin of one, two or more hairs broader at the apex. Therefore, the present alga has been proposed to be a new species of *Draparnaldia*, viz., *D. desikacharii* after the name of a reputed Phycologist, Prof. T.V. Desikachary.

## DIAGNOSIS

Filaments attached or free-floating, up to 8cm long. Main axis uniformly broad but tapers gradually in the apical region, axial cells cylindrical, elongate or short, 12 to 16µm broad and 12 to 32µm long, chloroplast girdle-shaped covering the median half of the cell, with 3 to 6 pyrenoids. Lateral branches of two types. Short laterals usually produced in whorls from 3 to 10, each short lateral ultimately terminating into a long multicellular hair, with a meristematic zone at the base, measure 120µm to 500µm in length at the base 4 to 6µm and at the tip 4 to 8µm broad. Long laterals also originate just below the septa, may be opposite, alternate or in whorls. Multiseriation may be present in long laterals.



Figs. 5-8: *Draparnaldia desikacharii* sp. nov. - 5, 6. Apical part of filament showing short laterals with multicellular hairs. 7, 8. Long laterals with group of short lateral, opposite and alternate. Scale bars: 30  $\mu$ m in fig. 5-8.



Figs. 9-11: *Draparnaldia desikacharii* sp. nov. - 9. Rhizoids on the base of the long laterals. 10. Rhizoidal branches and rhizoid from cross wall of lateral. 11. Origin of rhizoid from cross wall.

Branches may originate at the cross wall of the filament. Long laterals repeat the morphology of main axis. Cells variable in shape 26 to 38  $\mu\text{m}$  broad and 20 to 54  $\mu\text{m}$  long. Rhizoids of two types, one type arises from the cross walls of the filament and the other from the basal cell of the axial filament.

*Filamenta affixa aut fluitantia, usque ad 8cm longa. Axis principalis usque latus, in regione apicale, autem, gradatim attenuatus. Cellulae axiales cylindricae, elongatae brevesve. 12 ad 16  $\mu\text{m}$  lat., 12 ad 32  $\mu\text{m}$  long. Chloroplastus cinguliformis, dimidium cellulae medium obtegens et 3 ad 6 pyrenoides abens. Duos typi lateralium ramorum, 3 ad 10 rami laterales breves per verticillum, omnis lateralis brevis in pilum longum multicellularem apice terminans, qui zonam meristematicam ad basim habet; longitudo brevis pili: 120-150  $\mu\text{m}$ ; latitudo: 4-6  $\mu\text{m}$  ad basim, 4-8  $\mu\text{m}$  ad apicem. Rami laterales longi necnon admodum infra septa nascuntur aut oppositi alternati vel verticillati. Multiseratio in ramis lateralibus longis admodum praesens. Rami e saepito filamenti admodum oriuntur. Rami laterales longi formam axis principalis iterant. Cellulae forma variantes (latitudo 26 ad 38  $\mu\text{m}$ ; longitudo: 20 ad 54  $\mu\text{m}$ ). Duo typi rhizoideorum: unus typus e saepito filamenti, alio e cellula basale filamentorum axialium nascuntur.*

Habitat: from a temporary water pool at Handia, Allahabad. Type specimen (Collection number 34) is deposited in the Algal Collections, Botany Department, University of Allahabad.

#### ACKNOWLEDGEMENTS

The authors are greatly indebted to Late Prof. D.C. Pandey, Head of the Botany Department, Allahabad University, for the guidance of this work and Prof. K.S. Bilgrami, Head, University Department of Botany, Bhagalpur for the incentive. I am also thankful to Dr. H. Croasdale for Latin description and C.S.I.R., New Delhi for financial assistance.

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